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Studies in the North American Convolvulaceae, II. The genus *Operculina*

HOMER DOLIVER HOUSE

The original description of the genus *Operculina* S. Manso was based upon the operculum-like structure, quatrefoil in shape, which tops the capsule in the type species — *O. macrocarpa* Urban. An examination of a large number of specimens of this and related species shows that the presence of an operculum is not in this case a generic distinction, for often of two species closely and evidently related by all other characters, one will have a well developed operculum and the other none or sometimes in a few specimens, only vestiges of one. While the type has irregular dehiscence some other species with an operculum have a valvular dehiscence to the capsules.

The common features, however, that do occur throughout a considerable group of species that seem by a preponderance of characters to center congenerically about the type of *Operculina* are as follows: the pear-shaped calyx, rounded at the base and narrowed above; the large imbricated sepals more or less chartaceous or parchment-like in fruit; the broadly campanulate-funnel-form tube of the corolla, and the strongly contorted anthers which are often protruding from the tube of the corolla. The capsules are usually large and thin-walled, often the upper hemisphere of the capsule thicker than the lower.

This extension of the genus seems to be the only satisfactory way to place properly those species variously assigned to *Merremia*, *Batatas*, and *Ipomoea*, with spirally-twisted anthers and other characters in common with species now placed in *Operculina*.

OPERCULINA S. Manso, Enum. Subst.

Bras. 16. 1836

Twining plants with woody or herbaceous, perennial stems, entire or divided leaves. Stems or peduncles often more or less winged. Calyx large, pear-shaped, constricted above, the closely imbricated sepals scarious or chartaceous and often colored,

usually enlarged in fruit. Corolla campanulate, campanulate-funnelform, or sub-salverform. Stamens included or protruding, the anthers spirally twisted. Disk hypogynus or obsolete. Ovary 2-celled, 4-ovuled. Capsules large, often extremely so, 2-celled and usually 4-seeded, or partially 4-celled, usually differentiated into an upper thicker and a lower thinner portion, or the thin-walled capsule covered by an operculum-like, quatrefoil cap which is deciduous at maturity. More rarely, the capsule of uniform texture and valved; the dehiscence transverse or irregular. Seeds large, black or brown and usually smooth.

Type species: *Operculina Convolvulus* S. Manso, *l. c.* (*Convolvulus macrocarpus* L., *O. macrocarpa* Urban). About 20 species of tropical distribution.

Turpithum Raf. Fl. Tellur. 4: 71. 1836.

Spiranthera Boj. Hort. Maurit. 226. 1837. Not *Spiranthera* A. St. Hil. 1823.

Piptostegia Reichenb. Nom. 113. 1841. — Hoffmannsegg, in Mart. Syst. Mat. Med. Veg. Bras. 78. 1843.

Ipomoea § *Operculina* Griseb. Fl. Br. W. Ind. 467. 1861.

Key to the North American species

Leaves entire.

Stems conspicuously winged.

Stems glabrous; corolla yellow, 4-5 cm. long. 1. *O. alata*.

Stems pubescent or pilose.

Corolla white; peduncles exceeding the subtending petioles. 2. *O. triquetra*.

Corolla violet; peduncles shorter than the subtending petioles. 3. *O. leptoptera*.

Stems not winged; peduncles usually winged.

Corolla white or cream-colored; leaf-blades deeply cordate, 10-30 cm. long. 4. *O. ventricosa*.

Corolla not white; leaf-blades shallowly-cordate, rarely more than 10 cm. long.

Corolla yellowish; peduncles obscurely or not at all winged, 1-2-flowered. 5. *O. rhodocalyx*.

Corolla scarlet or salmon-colored; peduncles conspicuously winged.

Corolla scarlet; peduncles 1-3-flowered. 6. *O. rubicunda*.

Corolla salmon-colored; peduncles flexuose, 2-7-flowered. 7. *O. alatipes*.

Leaves lobed or divided.

Stems winged; corolla white. 8. *O. macrocarpa*.

Stems not winged.

Corolla yellow; sepals 3 cm. long or longer; capsule 3–4 cm. in diameter.

9. *O. tuberosa*.

Corolla white or whitish; sepals smaller; capsules 1–2 cm. in diameter.

Leaves pinnately lobed or, if palmately lobed, not cut to the petiole.

Leaves palmately lobed, the segments much toothed or cut; petioles and stem hispid.

10. *O. dissecta*.

Leaves pinnately lobed; plant glabrous.

Lobes lanceolate or broader, with undulate margins.

11. *O. Roseana*.

Lobes linear, margins entire.

12. *O. angustiloba*.

Leaves palmately lobed to the petiole.

Plant glabrous.

Leaflets lanceolate, acuminate.

13. *O. Palmeri*.

Leaflets elliptical-oblong, obtuse.

14. *O. platyphylla*.

Sepals and stems hispid.

15. *O. aegyptia*.

1. OPERCULINA ALATA (Ham.) Urban, Symb. Ant. **3**: 343. 1902.

Convolvulus alatus Ham. Prodr. Fl. Ind. Occ. 24. 1824.

Ipomoea Hamiltoni G. Don, Gen. Syst. **4**: 268. 1838.

Ipomoea pterodes Choisy, in DC. Prodr. **9**: 361. 1845. — Griseb.

Fl. Br. W. Ind. 467. 1861.

Ipomoea altissima Mart.; Choisy, *l. c.* 359.

Operculina pterodes and *O. altissima* Meissn. in Mart. Fl. Bras. **7**:

313. 1869.

Ipomoea alulata Miquel, Linnaea **18**: 599. 1844.

Operculina populifolia Hallier f. Bot. Jahrb. **16**: 550. 1893.

(Ex spec. Wright no. 3083.)

Type locality: Near Scarborough, Tobago.

Distribution: Cuba and the Lesser Antilles, northern coast of South America and adjacent islands.

Illustrations: Mart. Fl. Bras. **7**: *pl.* 75.

2. OPERCULINA TRIQUETRA (Vahl) Hallier f. Bot. Jahrb. **18**: 120.

1894

Convolvulus triquetra Vahl, Symb. **3**: 30. 1794. — Schlecht.

Linnaea **6**: 738. 1831.

Ipomoea triquetra Roem. & Schultz, Syst. **4**: 231. 1819. —

Choisy, in DC. Prodr. **9**: 360. 1845, excl. syn. Ham. & G.

Don.

Type locality: St. Croix.

Distribution: Lesser Antilles (St. Croix, St. Thomas, Santa Cruz and Tobago), Venezuela, Guiana, and Brazil.

3. OPERCULINA LEPTOPTERA Urban, Symb. Ant. **3**: 342. 1902

Type locality: Hateurs des Trois Islets, *Père Duss 426* (type).

4. OPERCULINA VENTRICOSA (Bert.) Peter, in Engl. & Prantl, Nat. Pfl. **4**^{3a}: 32. 1891

Convolvulus ventricosus Bert. in Colla, Hort. Ripul. 37. 1824.

Not *C. ventricosus* S. Manso, 1836.

Ipomoea ventricosa G. Don, Gen. Syst. **4**: 274. 1838.—Choisy, in DC. Prodr. **9**: 360. 1845.

Type locality: St. Bartholomew.

Distribution: Lesser Antilles; Martinique, Antigua; French and Swedish Islands; Guadeloupe, St. Bartholomew, etc.

Illustrations: Jacq. Vind. **3**: *pl.* 69.

5. *Operculina rhodocalyx* (A. Gray)

Ipomoea rhodocalyx A. Gray, Proc. Am. Acad. **22**: 439. 1887.

Type locality: "At base of hills, Tequila, Jalisco [Mexico], Palmer No. 421, 1886" (type).

6. *Operculina rubicunda* nom. nov.

Ipomoea alata J. N. Rose, Contr. Nat. Herb. **1**: 108. 1891.

Not *I. alata* R. Br. 1810; nor *I. alata* G. Don, 1838. Not

Operculina alata (Ham.) Urban.

Similar in habit to *O. alatipes* and *O. rhodocalyx*. Leaf-blades thin, triangular-ovate, 3–8 cm. long, shallowly cordate, entire, acuminate; petioles shorter than the blades; peduncles exceeding the subtending petioles, broadly 2-winged below the middle, 1–3-flowered; pedicels 1.5–2 cm. long, clavately thickened and angled, somewhat deciduous in fruit; sepals membranaceous, acute, 2.5 cm. long, the outer ones more or less tinged with brick-red; corolla subsalverform, scarlet, the tube about 5 cm. long and 1 cm. in diameter, the limb 2.5–3 cm. broad, the spirally twisted anthers equaling the tube or barely protruding; capsules globose, 1.5 cm. in diameter, 2-celled, 4-seeded; seeds black, glabrous, 6 by 8 mm.

SONORA: Alamos, *Dr. E. Palmer 706*, Sept. 16–20, 1890, type, n the National Herbarium.

Ymala, *Dr. E. Palmer* 1709, Sept. 25–Oct. 8, 1891.

MICHOACAN: Real de Guadalupe, *E. Langlassé* 352, Sept. 12, 1898.

Differs from *O. rhodocalyx* by its less cordate, thinner and more triangular leaf-blades, winged peduncles and scarlet corollas; from *O. alatipes*, by its more slender habit, fewer-flowered inflorescence, and smaller scarlet corollas.

7. *Operculina alatipes* (Hook.)

Ipomoea pterodes Seem. Bot. Voy. Herald 171. 1854. Not *I. pterodes* Choisy, 1845; nor *I. pterodes* Griseb. 1861.

Ipomoea alatipes Hook. Bot. Mag. *pl.* 5330. 1862.

The stout peduncles curved, broadly 2-winged below the middle, 2–7-flowered and strongly flexuous between the pedicels, the pedicels secund and upright, thickened: calyx 2.5 cm. long: corolla subsalverform, 6–7 cm. long, salmon-colored, the limb 4.5–5 cm. broad, with five obscure, rounded lobes.

Distribution: Southern Mexico to Columbia.

8. *OPERCULINA MACROCARPA* (L.) Urban, Symb. Ant. 3: 343 1902

Convolvulus macrocarpus L. Syst. ed. 10. 923. 1759. — Sp. Pl. ed. 2. 222. 1762.

Convolvulus operculatus Gomes, Mem. Acad. Lisb. 3: App. 27. 1812.

Ipomoea operculata Mart. in Spix & Mart. Reise Bras. 2: 547. 1828. — Choisy, in DC. Prodr. 9: 361. 1845.

Operculina Convolvulus S. Manso, Enum. Subst. Bras. 12. 1836. — Meissn. in Mart. Fl. Bras. 7: 211. 1869.

Type locality: America.

Distribution: Antilles and tropical South America.

Illustrations: Plum. Am. *pl.* 91. *f.* 1. Gomes, *l. c.* *pl.* 3. Mart. Fl. Bras. 7: *pl.* 74.

9. *OPERCULINA TUBEROSA* (L.) Meissn. in Mart. Fl. Bras. 7: 212. 1869.

Ipomoea tuberosa L. Sp. Pl. 160. 1753; ed. 2. 227. 1762; excl. syn. Plukn. — Choisy, in DC. Prodr. 9: 362. 1845, excl. syn.

Convolvulus gossypifolius Spreng. Syst. 1: 592. 1825.—Schlecht.

Linnaea 6: 742. 1831.

Convolvulus tuberosus Spreng. l.c. Not *C. tuberosus* Vell.

Ipomoea kentrocaulos C. B. Clarke, in Hook. Fl. Brit. Ind. 4: 213. 1874; excl. syn. Steud.

Ipomoea nuda Peter, in Engl. & Prantl, Nat. Pfl. 4^{3a}: 31. 1891.

Type locality: Jamaica.

Distribution: Cuba, Jamaica, St. Domingo and other West Indian islands, Central America, tropical South America and the old world.

Illustrations: Sloane, Jam. 1: pl. 96. f. 2. Bot. Reg. pl. 768 (white flowers probably an error).

10. *Operculina dissecta* (Jacq.)*

Convolvulus dissectus Jacq. Obs. 2: 4. 1767.—L. Mant. 204. 1771.

Ipomoea sinuata Ortega, Hort. Matr. Dec. 84. 1798.

Ipomoea dissecta Pursh, Fl. Am. Sept. 145. 1814. Not *I. dissecta* Willd. 1794, nor *I. dissecta* R. Br. 1810.

Ipomoea subpedata Desf. Cat. Hort. Par. ed. 3. 397. 1829.

Ipomoea nigricans Gardn. Lond. Jour. Bot. 1: 180. 1842.

Merremia dissecta Hallier f. Bot. Jahrb. 18: 114. 1894.

Type locality: America.

Distribution: Florida and Texas; Mexico, West Indies and tropical South America.

Illustrations: Jacq. Obs. 2: pl. 28; Hort. Vindob. pl. 159.

11. *Operculina Roseana* sp. nov.

Low, extensively twining among bushes, 1–3 m. long, glabrous: leaf-blades ovate in outline, 4–7 cm. long, pinnately parted into 5

* The *Ipomoea dissecta* Willd. and R. Br. of the old world has often been confused with the American plant both on account of the homonymous name and their strong relationship. It cannot be consistently kept in a different genus but belongs to *Spiranthera* of Bojer, which is not separable from *Operculina* by any constant character.

Operculina coptica (L.)

Convolvulus copticus L. Mant. 559. 1771.

Ipomoea dissecta Willd. Phyt. 5. pl. 2. f. 3. 1794.—Sp. Pl. 1: 880. 1798.—R. Br. Prodr. 487. 1810.

Ipomoea coptica Roth, Nov. Pl. Sp. 110. 1821.—Choisy, in DC. Prodr. 9: 384. 1845.

Tropical Africa, Asia, East Indies, and Australasia.

lanceolate lobes, the lobes contracted below the middle, the margins undulate or subsinuately toothed, the middle lobe longest, broadest below the middle and tapering to an acute or acuminate apex, two of the lateral lobes arising from near the base of the middle lobe, the other two entirely basal and often again somewhat 1-2-lobed on the outer margin; petioles shorter than the blades: peduncles 3-6 cm. long, 1-flowered; pedicels about 2 cm. long, thickened above, especially in fruit, sharply angled but not winged: sepals equal, 1-1.5 cm. long, oval or oblong, rounded at the apex, margins scarious: corolla campanulate-funnelform, yellowish-white, about 3 cm. long, the limb as broad, silky-hirsute on the plicae without with blackish hairs, densely so in bud, the strongly contorted anthers protruding or inserted: capsules globose, 1.5 cm. in diameter, topped by a quatrefoil, deciduous operculum, with rounded lobes, thick and coriaceous in texture, the walls of the capsules thin and submembranaceous, semitranslucent.

SONORA: Agiabampo, *Dr. Edward Palmer* 781, 1894, type, in the National Herbarium, sheets no. 208789 and 208790.

MORELOS: Puente de Ixtla, *Rose & Hay* 5320, July 4, 1901.

CHIAPAS: San Vicente, *Goldman* 871, April 20, 1904.

The three specimens seen indicate a most remarkable range, and the species will undoubtedly be found in many intervening localities. The specimens from Morelos and Chiapas have the lobes of the leaf-blades relatively shorter and broader than the type specimens from Sonora. The leaf-outline is strikingly odd and not closely simulated by any other known species of *Operculina*, except the next which may prove to be but an extremely narrow-lobed variety of *O. Roseana*.

Operculina Roseana was described without name, in Contr. U. S. Nat. Herb. 1: 344. 1895, by Dr. J. N. Rose, for whom it is now named.

12. *Operculina angustiloba* sp. nov.

Similar to *O. Roseana*, but more slender; leaf-blades more elongate in outline, primarily 3-lobed, the middle lobe with 2 lateral lobes at or near its base, the lobes linear, entire, somewhat emarginate, the middle lobe 3-5 cm. long, 1.5-2 cm. wide, the lateral lobe 0.5-3 cm. long and usually narrower than the middle lobe with small lateral segments near the middle in addition to those at the base: peduncles 6-8 cm. long, bracts linear-lanceolate, 5-6 mm. long; pedicels thickened above, 2.5-4 cm. long: sepals 10-13 mm. long, greenish, tinged with purple above: cor-

olla-limb somewhat broader than *O. Roseana*, 4–5 cm. broad, the margin subentire, the plicae hirsute without with black hairs.

SAN LUIS POTOSI : San Dieguito, *Dr. Edward Palmer 112*, June 13–16, 1904 ; type in the National Herbarium.

13. **Operculina Palmeri** (S. Wats.)

Ipomoea Palmeri S. Wats. Proc. Am. Acad. **24** : 63. 1889.

Type locality : Guaymas, Sonora [Mexico], *Dr. Edward Palmer 75*, 1887 (type).

Distribution : Stream beds and ravines, Sonora, Mexico.

14. **Operculina platyphylla** (Fernald)

Ipomoea Palmeri platyphylla Fernald, Proc. Am. Acad. **33** : 90. 1897.

Resembling *O. Palmeri*, but the stems smoother, leaflets broader, more obtuse at the ends ; peduncles often many-flowered ; corolla longer than in *O. Palmeri*.

Type locality : Acapulco, Guerrero [Mexico], *Dr. Edward Palmer 415*, 1894–95 (type).

15. **Operculina aegyptia** (L.)

Ipomoea aegyptia L. Sp. Pl. 162. 1753.

Convolvulus pentaphyllus L. Sp. Pl. ed. 2. 233. 1762.

Ipomoea pentaphylla Jacq Coll. **2** : 297. 1788.

Ipomoea pilosa Cav. Ic. **4** : 11. 1797. Not *I. pilosa* Sweet.

Convolvulus nemorosus Willd. in R. & S. Syst. **4** : 303. 1819.

Spiranthera pentaphylla Bojer, Hort. Maurit. 226. 1837.

Batatas pentaphyllus Choisy, Conv. Or. 54. 1834. — In DC.

Prodr. **9** : 339. 1845.

Type locality : Tropical America.

Distribution : West Indies ; central and southern Mexico to Brazil and Peru. Tropics of the old world.

Illustrations : Herm. Lugdb. *pl.* 185. — Jacq. Coll. **2** : *pl.* 319. — Wight, Ill. Ind. Bot. *pl.* 7. — Cav. Ic. **4** : *pl.* 323. — Wight, Ic. *pl.* 834.

The commonly accepted name for this species, *Ipomoea pentaphylla* (L.) Jacq., is plainly antedated by the Linnaean name *I. aegyptia*. Linnaeus did here what he frequently did in the case

of other species, *i. e.*, he changed the name of the species in the second edition of the Species Plantarum from that of the first edition. The two Linnaean names are shown to be synonymous by the same pre-Linnaean citations given under both.

In addition to the fifteen species of North America the following two species are found on the western coast of tropical South America and may occur in Central America:

***Operculina ampliata* (Choisy)**

Ipomoea ampliata Choisy, in DC. Prodr. **9**: 361. 1845.

Type locality: "Campeche, ins. oceani Pacifici."

***Operculina codonantha* (Benth.)**

Ipomoea codonantha Benth. Pl. Hartw. 120. 1843.

Type locality: "In sylvis prope Guayaquil."

SPECIES INQUIRENDÆ

Operculina Pavoni Hallier f. Bot. Jahrb. **16**: 550. 1893. "Nova Hispania; Pavon, in herb. Boiss."